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SOME NOTES ON A LUMINOUS SOUTH AFRICAN FULGORID INSECT (*RHINORTHA GUTTATA*, WALK.), TOGETHER WITH A DESCRIPTION OF ITS PARASITIC LEPIDOPTEROUS LARVA.

BY H. W. BELL-MARLEY.

AMONG our South African *Fulgoridæ*, we have here, at Durban, one of two recorded species of the genus *Rhinortha*, viz. *R. guttata*, Walk. (Distant's 'Insecta Transvaaliensia,' vol. i. p. 186, tab. xviii. f. 1), the other being *R. marleyi*, Dist., more recently described (*l. c.* p. 206, f. 37), and I confine attention to the former species. This South African Fulgorid, in common with all the other members of the Family, inhabits thick hedges and bush, preferring these, I suppose, as a protection against their many enemies—birds, especially *Cinnyris*, and lizards. This insect, though long known to me in Natal, has never been plentiful, not more than half a dozen or so coming to light during the season.

Quite early in April last my attention was drawn to this species, which had been more than a nuisance to the occupants of one house in particular, their evening siestas and "bridge" parties being quite disorganised by the abrupt appearance of these insects, which could be counted in dozens at a time, and, after having struck the verandah lights, crept wherever their fancy led them. My friend, wishing to save some for my inspection, placed a couple in a tumbler, but these, I learned, had aroused the Persian kitten's attention, who ate them, so I could only hazard a guess as to what the species was like.

One fine afternoon later, on looking for something else in the garden hedges, I caught sight of a brown movement behind a

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stem ; this I at once recognized to be no other than a large but strange *Rhinortha guttata*, but, owing to the thorny nature of these bushes, my coat-sleeve caught ; I at the same time lost sight of the Fulgorid, and it was not until a subsequent date (? May 14th) that I was again afforded another opportunity of visiting the garden—only this time it was in the evening, after dinner, when, thinking I saw an old Glowworm (*Lampyrus*) close by, I made for the spot. Some mention may be made of this shrub, which is widely distributed about the gardens on the Berea and elsewhere. Besides being ornamental, it produces a large, oval, scarlet fruit, rather acrid but tempting ; its foliage is as handsome as the rest—dark green leaves, with light under surfaces, supported by firm stems, and is strongly fortified with crowns of sharp thorns, which give most painful scratches. To the natives it is known as the “Amatungulu,” but I see in Medley-Wood’s ‘Natal Flora,’ p. 81, it is enumerated as *Carissa grandiflorus*, Linn. The evening was warm, a short shower having freshened things up a little, giving the foliage, &c., a silvery appearance, while overhead, without a moon, some stars with the scintillating points of the Southern Cross were just visible. On my approach—which, I suppose, had been noticed—the light moved away almost out of sight, and my curiosity being aroused, I waited until I saw it reappear, which it did, but higher up, making it still more difficult to observe, as I have already alluded to these strongly guarded bushes, which will not permit any liberties being taken with them. Keeping my eye on this spectre, which kept constantly moving its position, I wedged my hand in between the foliage, and grabbed in the direction of this luminous body. I was at once sure that if I had missed my object, I had something else of a painful nature to console myself with. My next object was to examine what I held, and which I carried to the dining-room lights. Now came a perplexing feature. I found, besides some fine specimens of thorns, I had secured an old worn and battered *R. guttata*, which has already been referred to ; another was unlike anything I had seen—a perfect stranger to my entomological experience—certainly no glowworm. For some moments I surveyed their respective peculiarities, turning over in my mind what were their relations to each other. This surely was the beginning of some



mystery. This woodlouse-shaped grub, just over half an inch long, but tapering slightly at both ends, with a thick white mantle which broke apart in rings when it made any movement, gave a slug-like appearance to its other points. As it is to again occupy some more of our attention, we will leave it for the present. That night and the one following I looked in the hedges for another light, but was not rewarded with success.

In the 'Transactions' of the Entomological Society of London for the year 1895, p. 429, the question of luminosity among certain *Fulgoridæ* was discussed by Mr. Distant,* and later the same writer makes allusion again to the subject in his 'Insecta Transvaaliensia,' vol. i. p. 182. The late Mr. A. D. Millar, of Durban, a keen collector, once told me he had noticed a light one night when hunting in Zululand, which he attributed to a species of *Pyrops*, a larger insect than any of our other Fulgorids; his reason for mentioning this Fulgorid was their presence and visits to the tent lights. The natives gave it the name of "Nkanyezi" (a candle). Mr. Distant (*supra*), speaking of this luminous property in *Fulgorinæ*, says it is an exploded theory, and long since disproved by collectors, but concludes his remarks by saying that explanation might be found in parasitic and luminous micro-organisms as have been discovered to have caused the luminosity of midges (*Chironomidæ*), and *Talitrus*, a genus of Crustacea (*Amphipoda*). When I likened the light as mentioned to that of a glowworm, it may be readily conceived this would be the first thought to enter one's mind. Having been quite satisfied that the light was the work of this *Rhinortha* and parasite, I took them to a dark room and awaited further developments, but nothing would induce it to repeat the phenomenon. The white powdery material that adorned the larva puzzled me, and it was not till some time after this that I was able to understand its purpose, as I hope later to explain. Another strange feature about the light, which was white and not electric white, as shown by *Lampyridæ*, was, it appeared paler from a distance.

The subject is, indeed, an interesting one, and it is not without a little satisfaction that I am, so far as one species is

* "On a Probable Explanation of an Unverified Observation relative to the Family *Fulgoridæ*."

concerned, able to announce this rare occurrence in Natal, and, it may be, the means to throw more light upon the subject as I proceed with these notes. With the assistance of my friend, Mr. Cooper, we examined the bushes again for more material to work upon, and in one sunny corner of the grounds where the bushes were blooming—their beautiful stellar-shaped flowers and fruit attracting numerous visitors—we collected from the inside stems nine old examples of *R. guttata* of various sizes, each one more or less carrying its parasite: on two large females there were one grub on each side of their bodies, where they were partly hidden by their host's wings, each larva as heavy as herself. In other cases I counted as many as five, all of different sizes, attached to the wings and back; on another small female there were two large larvæ, one a little larger than the other, each protected with the white mantle, besides the wings. As may be supposed, the Fulgorid could only with difficulty lift her abdomen to crawl, and quite unable to jump, a habit with most *Fulgoridæ*. I could not help pitying these miserable starved insects, for it looked as if here Nature had made some error; and from what I could see at this stage, the Fulgorid's life was a matter of a short time, contented by crawling to a stem, where it remains till the larva thinks fit to leave it.

As may be surmised, having located the grub, I was equally anxious to learn more about its pupa, which we agreed could not be far distant; this we also succeeded in discovering, Mr. Cooper finding the first one. When I had found six or seven, it seemed strange our eyes should have deceived us so long. Overhead, attached to the under surface of a leaf, was a white oval mass of a beautiful fleece-like formation, with little flakes suspended; this, with its support and the sun shining through, gave the green an opaqueness, with a darker silhouette for a background, which must be seen to be appreciated. I noticed almost all these cocoons were spun to leaves on the top of the trees; here, I suppose, the pupa would receive more warmth from the sun at this time of year, and, except some were smaller than others, all were prepared in the same way and place; on the leaves of some I noticed a small black ant (*Formica*) running about in an inquisitive manner.

With a survey of this paper, we see, as a summary, the

Fulgorid parasite and host, with its luminosity suggested, and, lastly, the next stage to the metamorphosis being to complete its cocoon. As *R. guttata* is of a retiring and quiet disposition, it will be interesting to relate how its parasite takes possession of its host.

About the end of the rainy season (March) she seeks a hole or some other place where she deposits her ova, after which she leaves for the green stalks of the "Amatungulu," behind which, too, she hides, as during pregnancy her body is partly covered with the same material as that which clothes the larvæ, and so to hide these she has to look for suitable places. In this position she will remain for days, only altering or moving away on the approach of danger or alarm. I have already alluded to these parasites, who pass their whole life upon her, where her fertile body supplies them with nourishment; but the question will be asked: How do they find their way there, and what kind of parent is it that makes this provision for its future progeny? To this solution I have not yet arrived at any definite conclusion, but it may possibly be surmised in reason that the female Fulgorid during pregnancy in some way attracts the lepidopterous parent. These parasites, too, at an early age, may find their way up the Fulgorid's legs on to her body. Then there is another remarkable feature which struck me when examining these insects—the number of minute larvæ that could be found on one insect, and the impossibility, it would seem, of more than two ever attaining maturity. Was this not an indiscretion on the part of the parent, and quite unusual? for very likely all these larvæ may be out of one brood, but stunted by reason of short rations! This theory of mine is open to confirmation, of course; at the same time, of the two suppositions I am inclined to favour this one. Had these *Fulgoridæ* which I had under observation lived long enough, I might have been able to determine their respective ages; I firmly believe they are some seven or eight weeks before pupating. Another point to consider is, most of these Fulgorids died shortly after capture, and their parasites had followed suit; so it seems quite clear the parasite has to take its chance. Those insects I examined where the larvæ had fastened on showed the parts much bruised, with their covering of white

powder removed. The reason is apparent, since the egg cavity of the Fulgorid serves the purpose of feeding its parasite; if this grub attracts her for any other purpose, I cannot conceive any motive in its object.

From time to time I have become acquainted with most of our Natal *Fulgoridæ*, and on these I have never noticed any signs of parasites. One insect (? *Dictyophara* sp.)* which I received from P. Shepstone some years ago I sent to Mr. Distant, with what looked like a small membracid larva attached to one of its wings. My recent observations now confirm it to be a parasite similar to the one we have been describing, but unfortunately this package, with other Rhynchota, never reached its destination.

It will now be interesting to learn how the cocoon is prepared; this necessitates us going back to the larva. During this stage I was able to watch, with much interest, the manner in which this little engineer worked, showing great persistency in attaining its object, and before I close its career, with the opportunity at hand, I will describe it further. In removing both grub and host to a glass jar with some foliage, by accident the larva was brushed off; having lost its grip and finding itself separated from its host, it at once moved away, looking and feeling for the Fulgorid, as so it appeared. Acquaintances being resumed, and without any apparent notice on the part of the Fulgorid, which allowed it to approach and try its luck again of regaining its place. After many acrobatic failures it gave it up; having felt round for something else, and not liking the glassy sides, it finally decided upon a leaf; its legs not being adapted for clutching smooth surfaces, this was remedied by a preparation of fine silky threads, with which it covered the leaf and made progress easy. The difficulty obviated, its next move was to remove some of the mantle which covered it, and prepare a foundation for the cocoon. Those who made a study during schoolboy days of keeping silkworms (*Bombyx mori*) will understand these preliminaries and the pleasure that attended them. For some time I watched these proceedings, the larva working vigorously, removing first the fleece that covered its lower body, twisting its body at all angles without shifting

* 'Insecta Transvaaliensia,' vol. i. p. 190.

once its position. Unfortunately time prevented my stopping longer, and on the next occasion, about an hour after, it had buried itself beneath; so, like the story of the professor and the mushrooms, I had lost my chance. The cocoon made had all the characteristics of the former; I found the same piled-up heap, with its slender little filament, adorning carefully this architecture. Next day, for the purpose of seeing what it now looked like, I prised up the covering from the leaf; the larva, so quiet before, now evinced great alarm by beating its head to and fro so rapidly that for the space of several seconds I thought it would never stop. I was able at last to examine it. But how different, reduced to a small maggot, nearly white all over, unlike any caterpillar in my experience; body composed of segmented rings, fore legs soft and bulbous, without hooks, the third pair being different, much stouter; between these and the claspers (four pairs) was a cavity like in some *Lamellicornia*! Larva again much creased; the clasping legs were very short, but firm and large; the anal extremity was tubular—possibly, only I could not see—composed of another pair of claspers. This description appears, perhaps, a little vague, but was made after death, without the aid of a microscope.

I omitted to state that the pupa covering was very tough, resisting a sharp penknife in penetrating. The chrysalis, again, from white turns black, much like a *Sesia* ("clearwings"), but with no hooks about the segments. The first imago took sixty-one days, others sixty-nine and seventy-one days respectively, to emerge, with a temperature not lower than 63° indoors. The exit is made between the covering and the leaf, the larva having left that part flexible for that purpose. But I may note, as it is worthy of attention, perhaps, this feat on the part of the moth is not accomplished without some hard work by its pupa, and in every instance of emergence the exit was facing the leaf's stem. The metamorphosis now complete, a short description of the moth will terminate this communication.

The first moth emerged early one morning between 6 and 7 o'clock—a black moth, with nothing to recommend her, unless it is her quiet modesty as she clings to the leaf supporting her white sepulchre. As I inspect her, which she allows me to do without the least signs of any timidity, I find I am wrong in my

judgment. As the early morning sun catches her sheeny black wings with shades beautifully marbled with violet-black, I find it difficult to determine the class to which she belongs. About $\frac{7}{8}$ in. in expansion. Antennæ very feathery; body with lighter bands; the last segment is slightly fringed, giving the anal extremity a naked appearance, which she allows to be exposed; in the centre of each top wing is a small copper irregular dot, otherwise she appears sooty black. The legs are long for such a small insect, and I noticed, when resting, these were always straightened out as she folds her wings under about them. One I had under observation till she died never once left her first position, and never attempted to fly when touched. From this I was led to suppose she would under more natural conditions lay her eggs on the pupa-case or thereabouts.

Seeing now that the moth (June) is out, and the ova of the Fulgorid awaiting the early rains before hatching—probably September or later—the ova of the fertile moth deposited now would not, I think, hatch out till winter was well over. In this I am able, as it were, to lend support to my contention of the young larvæ finding their host, which then would be well advanced. I regret, though both male and female were out at the same time, no copulation took place in the breeding apparatus. The male moth is so much smaller, and not black, as the female; his wings have a faded appearance of being mixed with umbers and browns, not by any means equalling the lustre of his mate. He is very quick on the wing; at the least disturbance he takes flight, and tumbles about some time before resting.

As I am enclosing for my friend the Editor both sexes, together with larva and host, &c., I shall await with impatience his report as to what genus and species it will be known by in future.

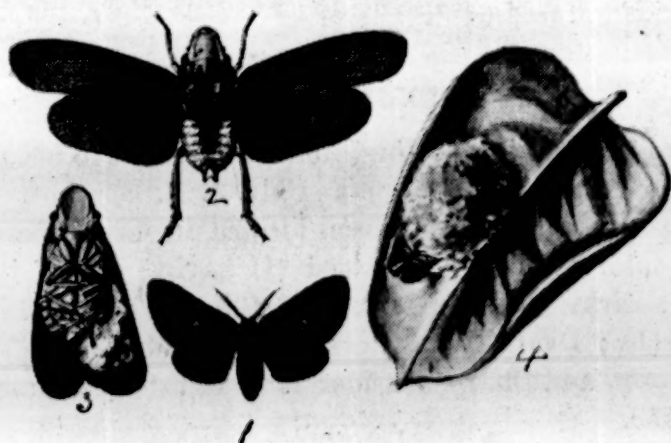
What puzzles me not a little since I made this discovery, and keeps returning to my mind as I write, is that this larva or its cocoon should have evaded me so long. I have inspected these same bushes for almost ten years—weekly, I may say. *R. guttata*, with others, I have found, and had either been there at these times, it is only reasonable to suppose I should have noticed them.

I believe some years ago the late Mr. A. D. Millar found, when breeding two species of *Lycænidæ* in Natal, that both butter-

flies (*D'urbania* spp.) afforded the rare occurrence, in the larval stage, of being parasitical. (Notes wanting.)

With approach of cold weather all signs of the Fulgorid parasites disappeared, their purpose in life seemingly unfinished, and, as usual, the busy little red ant and others could each day be noticed persevering in their labours of removing the awkward pieces of the legacy left them.

Once more, as it were, we see one of the many instances where Nature seems not to interfere in the struggle for existence.



1. *Epipyrops fulvipunctata*. 4. Pupa of same. 2 and 3. *Rhinortha guttata*, Walk.

We cannot understand her motives in choosing for the perpetuation of some species, in the way these pages have shown. What better example can we have for the "Survival of the Fittest," quite of an unorthodox kind? We have been afforded an opportunity of studying a phenomenon perhaps with an individuality of its own.

Natal: Durban.

ADDENDA BY W. L. DISTANT.

Genus EPIPYROPS.

Epipyrops, Westw., Proc. and Trans. Ent. Soc. Lond. 1876, pp. xxiv. and 522; Hmps. Journ. Bomb. Nat. Hist. Soc. xx. p. 109 (1910).

Epipyrops fulvipunctata, sp. n. (fig. 1).

Head, thorax, and anterior wings somewhat shining black; abdomen and posterior wings pitchy-black, and more opaque; anterior wings with an ochraceous spot near middle; the scales of the anterior wings have a distinctly rugose appearance; margins of the abdominal segments narrowly and obscurely ochraceous, more distinct beneath than above.

Exp. ♂ 19, ♀ 23 millim.

Hab. Natal; Durban (Bell-Marley).

I have placed all the specimens figured in the illustration, and which were sent to me by Mr. Bell-Marley, in the collection of the British Museum.

BIBLIOGRAPHY.

In the compilation of this Bibliography I have been kindly assisted by Sir G. F. Hampson and Mr. J. H. Durrant.

The genus *Epipyrops* has been located in several families by different entomologists: Westwood (1) having placed it in the *Arctiidae*; Kirby (Cat. Lep. Het. i. p. 490 (1892)) listed it under the *Liparidae*; Dyar (4) and Rothschild (9) among the Tineids; but Hampson and Sharp consider it to rightfully belong to the *Limacodidae*.

(1) *Epipyrops anomala*, Westw., Trans. Ent. Soc. Lond. 1876, p. 522.—Hong Kong. This description is contained in a paper entitled "Notes on the Habits of a Lepidopterous insect parasitic on *Fulgora candelaria*."

(2) "Notes on the Parasitism of certain Lepidopterous Insects," by Prof. J. O. Westwood (Trans. Ent. Soc. Lond. 1877, p. 433).—This communication refers to a species of *Epipyrops* found on the Fulgorids, *Aphæna* sp., and on *Eurybrachis spinosa*; both species found in British India.

(3) G. C. Champion (Proc. Ent. Soc. Lond. p. xx. 1883) states that "he had not infrequently found larvæ attached to and feeding on the white cottony secretion so abundant about some of the smaller *Fulgoridæ*" in Central America.

(4) *Epipyrops barberiana*, Dyar, Ent. Soc. Washington, v. p. 43 (1902).—New Mexico. Perkins (Hawaiian Sugar Plant. Assoc., Bull. No. 4, p. 59 (1907)) records that Koebele found

this species very common in Arizona affecting *Fulgorinæ* (*Issinæ*, *Amphiscepinae*, and *Pæcilopterinae*).

(5) Dyar, Proc. Ent. Soc. Wash. v. pp. 180–81 (1903). Makes further remarks on *E. barberiana*, and on the Japanese species subsequently named *E. nawai*.

(6) *Epipyrops nawai*, Dyar, Proc. Ent. Soc. Washington, vi. p. 19 (1904).—Japan. Nawa, 'The Insect World' (published in Japan), vii. pl. i. (1903); Kirkaldy ('Entomologist,' xxxvi. p. 130 (1903)) gives some extracts from this paper written by U. Nawa, which states that the larvæ live on some *Cicadidæ* (*Tanna japonensis*, Dist., *Oncotympana maculaticollis*, Motsch., and *Graptopsaltria colorata*, Stål), as well as on the Fulgorid, *Ricania japonica*.

(7) Fam. *Epipyropidæ*. Perkins, Hawaiian Sugar Plant. Assoc., Bull. No. 1, p. 79 (1905), describes three genera—*Palæopsyche*, *Agamopsyche*, and *Heteropsyche*.

Palæopsyche melanais, Perkins, l. c., p. 80.—Queensland. On a Jassid.

Heteropsyche pæcilochroma, Perkins, l. c., p. 82. — Cairns. Bred from a Fulgorid.

H. melanochroma, Perkins, l. c.—Sydney, New South Wales. From various Fulgorids and Jassids.

H. micromorpha, Perkins, l. c., p. 83.—Sydney, New South Wales. From a peculiar Fulgorid on fern.

H. dyscrita, Perkins, l. c.—Sydney, New South Wales. From minute Fulgorid.

H. stenomorpha, Perkins, l. c.—Sydney, New South Wales.

Agamopsyche threnodes, Perkins, l. c., p. 84.—Cairns. On Delphacids.

(8) *Epipomponia*, gen. n., Dyar, for *Epipyrops nawai*. New York J. Ent. Soc. xiv. p. 111 (1906).

(9) *Epipyrops doddi*, Rothsch., 'Novitates Zoologicæ,' xiii. p. 162 (1906).—Queensland. To this description is added some field and breeding notes by its discoverer. Mr. F. P. Dodd. Found on several species of the *Fulgorinæ*, viz. *Dictyophora præferrata*, Dist., *Olonia* sp., and a species belonging to the *Flatinae*.

(10) *Epipyrops poliographa*, Hmps., J. Bomb. Nat. Hist. Soc. xx. p. 109, pl. f. f. 12 (1910).—Ceylon.

(11) "Über parasitisch lebende Lepidopteren," by H. Zerny, Wien Verh. zool.-bot. Ges. 1910, p. 8.

LITHOBIUS DUBOSCQUI, BRÖLEMANN, A CENTIPEDE
NEW TO THE BRITISH FAUNA.

BY RICHARD S. BAGNALL, F.L.S., F.E.S.

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ON several occasions I have observed a small Lithobiid, which, when disturbed, instead of running swiftly to the edge of a stone and perhaps dropping like the common *L. crassipes*, immediately curls up and rolls off the surface of the stone that has just been raised on to the ground. The small number of antennal joints (up to twenty-eight) as compared with *L. microps* puzzled me, and I therefore submitted examples to Dr. Brölemann, of Pau, who replied that the species was referable to *Lithobius duboscqui*, Brölemann. I have compared my examples very carefully with Brölemann's description, a copy of which he kindly sent me, and they agree in every particular.

As examples of this species will almost certainly be found standing for *L. microps* in British collections, I give the following roughly translated extracts from the original description.

The rounded hind angles of *all* the dorsal scuta place it in the section *Archilithobius*.

LITHOBIUS DUBOSCQUI, Bröl.

Brölemann, 'La Feuille des jeunes Naturalistes,' iii^e sér., xxvi., Nos. 318-319, 1896.

Body very convex, shining, somewhat parallel or more or less narrowed anteriorly, constricted behind the head and broadest about the eighth segment. Yellow, head reddish-brown and the legs light, especially the two posterior pairs, which are yellow-ochre or pale yellow. Length 5.5 to 7 mm., breadth 0.6 to 0.8 mm.

Cephalic plate subcordiform, the posterior angles rounded and the posterior border margined. Antennæ very short, composed of twenty-three to twenty-eight segments, broader than

long, the last equal to about the length of the two preceding together. . . . Ocelli always three in number, disposed in a horizontal line, the posterior ocellus being the smallest and the following the largest. Coxæ of poison-claws longer than broad, with a very distinct median furrow; armed with 2 + 2 small but nevertheless well-formed and sharp teeth. All scuta margined laterally. . . .

The two last pairs of legs are short, very stout, and without furrows or apophyses in the male. Coxæ unarmed.

Armature of fourteenth pair $\begin{smallmatrix} 0. 0. 1. 0. 0 \\ 0. 1. 2-1. 1-0. 0 \end{smallmatrix}$ claw double.

Armature of fifteenth pair $\begin{smallmatrix} 0. 0. 1. 0. 0 \\ 0. 1. 1. 1. 0 \end{smallmatrix}$ claw double.

Coxal pores small, circular . . . disposition generally as follows:—1. 2. 2. 2 or 2. 2. 3. 2 (exceptionally 2. 3. 3. 3 in one, and in another 1. 2. 2/3. 2.).

External genital organs in the female armed with 2 + 2 very strong and long spines, especially the outer pair, which are sometimes a little curved outwardly. Claw (*unguis*) large, trilobed, with the two inner "teeth" much more developed than the third, which is frequently reduced to a pointed spine.

It is recorded by Brölemann from various parts of France.

I first collected specimens of this species from under stones lying on or slightly embedded in loose rich soil on the Durham banks of the Derwent near Blanchland, April, 1913, and in the same month discovered it in the neighbourhood of Oxford and Manchester.

Dr. Brölemann informs me (*in litt.* April 28th, 1913) that the species must now be known as *Monotarsobius duboscqui* (Bröl.).

A DIARY OF ORNITHOLOGICAL OBSERVATION MADE
IN ICELAND DURING JUNE AND JULY, 1912.

BY EDMUND SELOUS.

(Continued from p. 136.)

June 10th.—It is curious that, during all this time, I have not seen the cygnets feeding or being encouraged, in any way, to do so, by either of the parent Swans, who seem themselves, also, to have gone fasting. Now, however—from 2 to 3 p.m., that is to say—there is an appearance of something of the sort, though, owing to the distance, I cannot be certain, for the birds have all gone over to the opposite side of the stream, in its wildest part, and no help being now afforded by any promontory or projection of the shore, I have to watch them from the crest of the nearest hill, which is too far for any clear view of minutiae. I get the impression, however, first, that one of the two is pulling up some grass or moist vegetation, for the cygnets, in a little creek of the shore, where they have landed, and, later, for the first time to-day that I have seen, she pulls up weeds from under the water, in the characteristic way, which appear either to drop, each time, on its surface, or remain upon it, as her head comes up—for certainly, I think, she does not eat them. She rests on the water, too, once or twice, after doing this, and her cygnets gather about her, which, it seems, is her intention; but that the latter eat the weed thus provided is not very apparent. If they do, I think it must be in a very toying, uneager sort of way, but this, if I remember, I have observed in similarly fed young cygnets of our own Mute Swan. Soon after this both birds come on shore again, followed by the young, and sit down on the grass, at the regulation distance—ten paces or so from one another. The chicks endeavour to press under the body of (presumably) their mother, as though she were on the nest. To avoid this, apparently, or because the position is not suitable

for it, she moves a little way off, and sits down again, and this is twice repeated. All this time she keeps cropping the grass about her, as she sits, but whether for the chicks or herself, I cannot determine, for it is impossible to see whether she lets it drop or swallows it—it may be either or both. Finally, however, the cygnets disappear beneath her plumage, and both birds lie, now, asleep, or at least with their heads on their backs. The Great Northern Diver is also asleep. He has been about, on the water, all this time, and now floats upon it, in the same attitude.

I now rise, and, without stooping or taking any precautions, walk away from them over the hill. I have not taken more than two or three steps when both the heads are thrown up, and the birds observing me. They cannot, therefore, it would seem, be really asleep, though they had every appearance of it. Certainly they seem like the proverbial weasel in this respect, yet by keeping still, and never either standing or sitting upright, I have been able to watch them at quite luxurious distance for the glasses. The stranger Swan has been absent now for the last two hours or so.

Harlequin Ducks are very numerous on the river. They delight in the little side nooks of comparatively smooth water, skirting the white, foaming torrents which here abound. Here they sit sunning (or, more often, clouding) themselves upon the rocks, and, when startled, will often throw themselves into the white, broken water, at such places as make it seem probable that they may sometimes lose their lives in this way. However, like others, they draw the line somewhere, and take to the wing when the turmoil is very tremendous. The pantaloon- rather than harlequin-like colouring of the male Harlequin Duck is extraordinary, and, from the point of view of concealing coloration, "enough to make Quintilian gasp and stare," but I, from the point of view of sexual selection, am more particularly interested in the white false eye, as one may call it, placed at about an inch from the real one. In the plate of this bird given in vol. vi. of Dresser's 'Birds of Europe' (as for the pagination of that work, I totally give it up) this spot is given quite wrongly, both by its size and position being made quite ineffective. Pains seem to have been taken (as would probably

be the artist's instinct) to get rid of the bizarre effect which it produces under nature, and to show the proper eye in a proper and ordinary manner. In reality, however, it is very difficult to see the bird with any eye but this false, staring white one, which, as it were, puts the real eye out, and though not near enough to it, properly to take its place, in appearance, yet is sufficiently so to stand for it in a burlesque sort of way; so that with this much more conspicuous and larger white circular mark, forcing itself on his attention, the observer finds it difficult to give the right pictorial value to the actual eye, or even, without an effort, to see or locate it, as such. A sort of pantomime effect of a grotesque-looking bird with a great, flat, white eye, which he knows is no eye, but can't help placing and seeing as such—it so overpowers, as it were, the real one—is what one gets in live nature, but not at all in the plate referred to, nor, I suspect in any plate. Now, the eyes of various birds are so brilliantly coloured as to make it indubitable for anyone who accepts the Darwinian theory of sexual selection (its acceptance, I believe, will, one day, be universal) that they have been rendered thus conspicuous through its agency. This makes this white spot, in place, as it were, of an eye which alone is quiet and orderly, in the midst of a face suggestive of carnival time an interesting thing. It is as though the female Harlequin Duck had missed, in it, something that should have been more in accordance with the general bizarrerie of its surroundings, and as the iris itself did not afford the necessary variations for selection to seize upon, had used, as a substitute, some which occurred, not far off it, in the feathering, and thus produced a mock eye, such as the law of artistic harmony (parallel to that which governs vocalic utterance) required in such a setting. It is difficult to assign any other special significance to these white spots. Signal- or recognition-marks they can hardly be, for they are eclipsed in this possible function by the much larger ones against the bill—too large for the effect here noticed, even had they been in place—and, moreover, the whole bird, if we accept this view, has been evolved as a signal, but only of one sex to the other. Of course, it may be said that the spot being thus situated, and just of the size and shape that it is, is a mere chance which has no significance. But to talk in this way, where

the coloration of any one species is concerned, is to use a very double-edged weapon indeed. On the other hand, if it has really been evolved as a more effective substitute for an eye not in keeping with the rest of the face, this is an interesting circumstance, as showing how active a factor the taste of a female bird is. But this is involved in the doctrine of sexual selection, and surely it is no more strange that variations which have ultimately produced a sort of mock eye should have been noticed and appreciated, than those should have been which have made a real one as yellow as is that of the Golden-eye, or as brightly ruby-coloured as is that of the Slavonian Grebe.

As for any effect being produced by the pantomime plumage of the male Harlequin Duck, by virtue of which it could be supposed to add one more to the many pungent illustrations of concealing coloration, which now usurp the province of sexual selection, I can only, after seeing the bird at large, protest against any such idea. No doubt it can hide itself, and, by keeping perfectly still, it might not be noticed, even by the keen-eyed Hawk or Falcon. But that only shows the protective powers of immobility, and how effective this agency is (though so little, comparatively, is said about it) as an antidote even to conspicuous coloration, and, in a certain degree, even to scent.* It is, in fact, that which has probably made the first of these, and, along with it, selection, possible—for the bird, or other animal, that, being hard pressed by enemies, yet keeps constantly in motion, will fare badly, however it may blend and harmonise.

June 11th.—I go to bed about 8, and get up again, at 11, with the idea of watching through the night. As I come out of my tent, there on the water, just in front of me, is the Great Northern Diver again, accompanied, this time, by its mate, which I take to be the female, for there is a noticeable difference in size between the two, and in the larger, rightly or wrongly, I seem to recognize the one I have seen before. These birds are not at all afraid of me. They dive and swim about together, often side by side, or float, facing each other, in attached and friendly fashion, sometimes quite near. Both are very vocal,

* The scent, through keeping still, will be less left about, thus lessening the chances of its being struck.

but the cry which they keep uttering is now quite a different one from that first heard—a softly shrill, quavering note, which is sometimes lower and softer, sometimes higher and shriller. The quavering quality gives it some resemblance to a laugh—a queer sort of laugh, indeed, from which the human element is wanting, yet suggestive of it, if even by its difference—elementals might laugh like this. To have these birds thus disporting within a few yards of one, sometimes, and looking at one curiously, without anything like shyness, is delightful. After a little time the two get separated, and, a little later on, having returned from an attempt to find the Swans, I only see the male—I think, at least, it is the larger of the two that is left. The other is now nowhere to be seen, which makes me think there must be a nest somewhere near—probably on the island—which she has left, to catch a fish or two, and now returned to.

As for the Swans, the pair seem gone, for the time, but between 11 and 12 p.m. the single one swims down the stream, and then flies off, over the first waterfall, with a complaining though musical cry. It must have circled back beyond the hill-line, for, a little later, I see it fly out from behind the island, in a way that I think I know, and, accordingly, it is very soon followed by another—I have no doubt the female of the pair—putting it to flight. The latter, having chased it, a little, comes down on the water, and swims back to the same point of the island from which she flew out. Here she lands, and, walking just beyond my sight, I, at once, hear the note of rejoicing, but it is only a single one, nor has she been met, on her return, by the male, who, had he been there, would in all probability have flown down to her, on the water, as he did on a former occasion—I feel sure, at any rate, that I should have seen something of him. Just as the male left his partner and cygnets, last night, on the nest, so he has also to-night, when they have abandoned it. It would seem to be his custom thus to fly abroad, nightly, as it would, no doubt, be that of the female as well, were it not for the cygnets. It is the return to the cygnets, therefore, which occasions these glad cries from the one parent, at any rate—the mother—whilst the male is equally moved to them by the return of his mate; and she too, no doubt, will be

better pleased to find him there. That the two are excited by each other's presence, and lift up their voices more joyously on that account, cannot be doubted, and I feel sure, myself, that the sally and putting to flight of the intruder has also its full effect, though it is quite possible that every home-coming may be thus signalised—that it is a part of the general beauty of swan life. What, indeed, can be the fundamental cause of such melodising, with the eloquent actions which accompany it, other than affectionate excitement? It is on the permanent factor of the domestic affections that the special stimulus acts.

The sun appeared above the mountains at 2.30 a.m. (it was, of course, light enough before), but took over a quarter of an hour to top them. I waited for it, and then went back to bed, Sigurdsson waking me, with a bottle of hot tea, wrapped in a lamb-skin, at a little after 8. Going out, then, with the glasses, I saw the two Swans, with their cygnets, on the island. The parents were cropping the grass, but whether they laid any of it down for the cygnets was difficult to make out, and before I could feel certain about it, all of them had taken the water, again. They swam out into the lake, or lake-like stream, and when they had reached the middle of it, and were all in a group, the female, first, rose, a little, in the water, and expanded the wings, with their tips still touching it. Then, face to face, and close together, the two birds threw up their heads, waved their wings, and rejoiced most musically—the scene that I have now many times recorded, but no stranger Swan had inaugurated it, or was to be seen on the water. Had she approached, as before, she would certainly have been chased away, in the usual manner, and had she even been within the range of binocular vision, my glasses must have detected her. Here, then, were spontaneous glad liftings up of the spirit, without any extraneous provocatives. There can hardly, I think, be a doubt as to the nature of the emotions manifested. The cry, the attitude, all the various movements and actions of the two birds, with their mutual excitement, and especially their close approach to and turning towards each other—everything shows pleasurable emotion, and, indeed, there is not much else that such a scene can proceed from, for that anger or alarm have nothing to do with it is fairly obvious. How happy, then, are these birds, how innocent is

their happiness, and how lovely the expression of it! With how many human ones, either in the savage or civilized state, does not this Swan family compare favourably, in all these respects; yet to bring death and non-fulfilment into the one is a crime, and into the other, a pastime. This makes our humanity but a matter of power or self-tenderness—the application of the golden rule, for there to be anything of sterling gold in it, should extend to all life, where possible, but so far is this from being the case that where men themselves are as incapable of enforcing their “rights” as are these Swans, they stand in very much the same position, or, owing to causes quite simple to follow, in a very much worse one—witness the Putumayo and Congo. What, then, is that which we designate a right, either amongst animals or men? Nature, all conscienceless, would seem to answer—Might; since not one can be pointed to which does not, at least, owe its origin to this factor. Does it not stand thus, then—that when we may, with impunity, and yet do *not* exercise a power by which we gain against others, the restraining influence is a sort of shame and compunction at using such power, which will sometimes withhold individuals, but not masses of individuals? But this feeling is only a bye-product, born out of complexity, and not of noble parentage either. It had no real, shaping influence in the evolution of species, or of man out of beast—nothing to do with that struggle which, though masked, is being still carried pitilessly on by the most humane man and the most seeming-pitiful* woman. Of all reflections that make towards pessimism, this, perhaps, is the deepest grounded, that all that seems best in one’s nature is the outcome not of main forces, but of bye-product only. The first, it can be said, have brought forth the second; and, if closely looked into, it may be answered, they will be found to smack of their origin.

After the scene which has given rise to these reflections, first, one of the Swans—the male, I think—and, before long, both of them, kept dipping for weeds, and I watched attentively to see if they were feeding the cygnets. For a long time this was difficult to make out, but, at last, I had the satisfaction of

* “Shamming-pitiful” would perhaps be a better expression, having regard to the feminine hat, &c.

seeing the cygnets nibbling at something in the water, which must, I think, have been the weeds brought up by the parents, for there was no appearance of any growing weed on the surface. They did so, however, only now and again, and in a casual and desultory way, as if they were learning, and did not clearly connect the finding of the weed with the parents getting it for them. As far as I could see, the general plan of the Swans was to keep dropping or leaving the weed (by which last I mean leaving go of it as soon as their heads emerged) about on the water, in a circumscribed area—quite a small space, where they kept all the time—and letting the cygnets find it, as they happened to, but I twice, at least, saw one of them (I think the mother) stretch out her neck towards one or other of the cygnets, and then bring down her bill upon the water. It was funny, sometimes, to see the cygnets clustered round the after half of the parent's body, as it stood upright in the air. I twice saw some weed—it must have been a fair quantity—thrown up by the feet of the submerged bird, as she paddled with them vigorously, to maintain her perpendicular attitude; but I cannot say if this was consciously done or not—probably not, for she must, I think, first have brought it up in her bill.

Previous to my last expedition, Sigurdsson had told me of a pair of Merlins that had their eyrie in a ravine of one of the mountains hereabouts, and I resolved to make this the next object of my investigation. We started accordingly on the afternoon of the day of my return, and had the tent pitched by about 4.30. The birds had made their home amidst very grim and wild scenery—*macabre* one might call it, could that be, apart from humanity—which, however, in a way, was represented. The mountain, it need hardly be said, is volcanic, and its black face of igneous precipices, with fragment-strewn slopes at their bases, is rent at irregular intervals by gorges so gloomy and titanic-looking, that to enter any one of them is to leave earth and move amidst a sort of infernal scenery. In one of the gloomiest of these there rose, almost from the centre of the chasm, an irregular prominence, crowned by a huge overjutting mass, the shape of which—with a green eye of lichen, and up-staring bristles of grass—suggested some nightmare-like animal; whilst almost opposite to it, flung out from the cliffs on one side,

a tall spire of rock, ending in a really striking resemblance to the head of a grim-looking, professorial old man, stood like a sentinel. On a ledge of the first of these two salient features—pressed, as it were, into the flank of the nameless creature forming its summit—hung the eyrie (small enough, almost, to call a nest), whilst on the chin, or long, thin nose, or sort of Scotch cap (for he wore one) of the other rock-born being, one or other of the birds would occasionally sit perched. These fantastic resemblances, I may say, are, or have appeared to me to be, more common amidst volcanic mountain scenery than where the outlines have been produced by the slow upheaval of sedentary rock-masses. The former, being largely due to the cracking of the cooled lava-sheet, this may be the effect of the greater variety of shapes which the fractured edges have assumed, since the chances of any such accidental resemblance would be thereby proportionately increased. Whatever the reason, these gloomy solitudes are often tenanted by monsters either of man or beast form.

There was only one place in which my tent could be pitched, so as to have a clear (which was also a near) view of the eyrie, and that was on the very crown, or forehead rather, of a little green knoll, surmounting and, as it were, peeping fearfully down into the horrors of the ravine below. Here it stood—one cord of it amidst the stones of the very rock's brow—uncomfortably shaken sometimes by spasmodic or continuous blasts of wind, but always firm-fixed—however it might be shivering—when I had strayed out, sometimes, and returned, and always there when I awoke in the morning. The eggs of these Merlins were still in process of incubation, on my arrival, and, at 5.45 p.m.—before Sigurdsson had left me—the female, who looks considerably larger than the male, had returned, and gone on to the nest, and she sat there continuously till a few minutes before 8, for the most part keeping very still, and only once turning round in it. At about 7, the male Merlin flew in, and sat in the near neighbourhood of the nest, first on one side of the gorge and then on the other, each time choosing the most salient point of an outstanding rocky buttress or bastion. He remained, thus perched, for perhaps twenty minutes, and then flew away without having visited the nest. A little before 8 p.m., as I say, the

female flew right down upon one of the lower slopes of the mountain, bounding the gorge, and, getting to the tent-door as soon as I could, I saw her there with the male bird, between whom and herself something was evidently taking place, for the one made several swift little darts at the other—the female, I think, at the male—but what with the wind and the flapping tent-sail, I lost them, and found it impossible to pick them up again with the glasses, upon the great surface of the slope, broken and irregular as it was. Both birds had been uttering their little quavering, shrill squeak of a cry (the same, in character, with that both of the Eagle and Sparrow-Hawk), and I still heard it, in a tone of import, though, to my vexation, I could not get them. The male now flew up to one of the points where he had perched before, and, shortly afterwards, I luckily got the glasses on the female, just as she flew from one place on the slope, where she had, I think, been all the time, to another, and here she made a few unmistakable, fierce, downward digs with her beak, to her feet, followed by the action of pulling something up from them, which assured me, in a moment, that she had prey, and was devouring it. It was the same scene, upon the mountain side, as with the Sparrow-Hawks, in Brittany, amidst trees, in the little plantation, nor can there be any doubt, I think, that, as in the case of the latter, the male Merlin had brought in booty for the incubating female. Just as with the Sparrow-Hawks, this was not brought to the nest, but to a place in its neighbourhood (though here much farther off), and in both instances this method may have been brought about owing to the sharp eyes and impatient spirit—or keen appetite rather—of the sitting bird. Never giving her husband time to come to her, it is natural that he should have got into the habit of waiting for her to come to him. Having finished her meal, the female Merlin flew back to the nest, and settled herself again on the eggs. She had been away, perhaps, a quarter of an hour. At 10.15 p.m. she hunches herself up on the eggs, and makes various movements, in which slightly spreading out the wings and bending down the tail are included—the head also is sometimes bent down into the nest. Now again, at 11.30, she goes through some quick rocking-horse-like movements not easy otherwise to describe. The object of these actions, or whether

there is any special one, I cannot tell. But for them, the bird has sat always in one position, her head turned the same way all the time. Soon after this I make up my bed, and retire.

June 12th.—When I look out of the tent, at a little before 3 a.m., I see the female bird still on the nest. She is very still, the head sunk, and I cannot see the eye—she appears to be asleep. So she remains for a quarter of an hour, then raises her head, opens her eyes and looks about, but she soon sinks it, and seems to go to sleep again. Then, at 3.30, she hunches herself up, a little, on the nest, and makes the same kind of movements as yesterday, but they are less marked and of shorter duration. No doubt the feeling of its eggs under it is an intense gratification to the brooding bird, and movements like these may mark the overflowing of such satisfaction, so to speak, as when a cat presses its paws, with delight, against the cushion on which she is lying. This, of course, would not apply to movements made for any definite purpose, but I can see none in these. It is a still morning, as yet, the sky obscured now, altogether, by heavy clouds, which, however, hang high, except upon the mountain tops. From the day after my arrival at Herra, Sigurdsson's farm, it has been wonderfully fine weather, especially the last three or four days, which have been all sun and blue sky, and quite hot, though always with a freshness in the air, which makes it very cold at night. A very still, calm morning is characteristic, after which the wind begins to rise, but sinks again in a few hours. Certainly this is generalising from a rather narrow basis of experience, but others do so, even where the basis is negative.

4.3 a.m.—More of the above-mentioned class of movement. The bird seems to hug herself on her eggs, as it were.

4.9.—Now she sinks her head under her into the nest, as though to examine, or rather to give herself the pleasure of touching the eggs, in a specialised manner; and again she makes these little hunchy movements upon them, as though she were hugging them. Then she preens her feathers, a little, and is now quiescent again. Whilst thus wholly given up to incubation, she hardly looks a bird of prey. Her expression is soft and maternal—the large, dark, full eye very fine. A bird

novelist might make something out of her—and the subject—I think ; it should be a hen one, indeed, for none can praise the female like the female—"this was sometime a paradox, but now the time gives it proof."

At 5.10 a.m. the male Merlin flies up, and the female out, to meet him, but I both miss her departure—my eye not being upon the ledge at the moment—and fail to see the first meeting. A moment or two later, I see the two birds together, on the side of the mountain, by the ravine. It was either in response to the cry of the male, or she uttered it herself, as she flew off, that the female left the nest. After the first meeting (probably) the male flew about twittering (for the cry is a sort of squeaking twitter, or twittering squeak, and twitter is the prettier word of the two) from point to point of the ravine side, perching now on one and now another, as before. I doubt whether, in this case, any booty was brought in by him for the female. If it was she must have disposed of it very quickly, for she was not engaged with it when I first picked her up on the hillside, and she had nothing in claw or beak when, shortly afterwards, she flew on to the cap of the old Scotchman's head—the pinnacle, that is, of the higher of the two peaks—whence, a moment later, she made a circle on to the ledge of the other, and covered her eggs. She was not, I think, absent five minutes. These two peaks, on a ledge of one of which the nest is situated, stand, as I have said, full in the ravine's path, but, though rising to some height, they are not lofty, as, indeed, the precipitous sides of the gorge, which overtop them upon either side, are not either—they scowl, but do not tower. My tent, therefore—perched upon its own little pinnacle—looks down, from a height of perhaps not more than twenty feet above it, directly on to the small eyrie, but over a chasm—formed by the bursting, as one may call it, of a tributary ravine into the central one—whose width may be about half that number of paces. Such a seat outwards, in my opinion, any throned one—"I would not change it."

6.10.—For the first time since my own sitting here began, the sitting bird turns round on the nest. She soon comes half back again, however, and, a minute or two afterwards, sits as before. Her tail is turned towards me, and this enables me the

better to see the odd movements—recurrent at not very long intervals—which she makes on the nest. I do not understand these movements. They do not seem deliberate and directed to the attainment of some special end, but rather of a spontaneous kind, as though they had their origin in the bird's own feelings, whatever these may be supposed to be. If there be an object in them at all, the one which they might best seem to subserve would, perhaps, be the rolling over of the eggs, so that every part of their surface should come in contact with the bird's warm body. There may be a tactile pleasure in thus rolling the eggs under the body, which, if it brought about any beneficial result, would have been fostered, as well as kept within due limits, by natural selection. But this explanation hardly satisfies me, for certain movements which cannot, as far as I can see, have anything to do with this supposed object, are left unaccounted for; and the cat's-paw theory is no better. From what I could catch of the movements of the Eagle on the nest, they were much of the same kind as those of its small relative.

6.10.—The sitting bird utters the little, sharp, twittering cry, and flies from the nest. I follow her, this time, well with the glasses. She flies low over the ground, and at a certain point, seems just to stoop upon it, rising and flying on again, almost without a pause, and she then seems to be carrying something in her claws. It certainly gave me that impression, but owing to the distance, and the smallness of the bird's body, with my never being able to get it against the sky-line, I could not be sure, and, unfortunately, she soon dipped into a gorge, and was hidden. Immediately afterwards, the male Merlin appeared, flying from the direction in which the other had flown, and going up, I think, from the ground—so much I can say of him, and so much is in accord with the supposition that he had brought in prey for his partner. The latter, after a short interval, flies back and covers her eggs again. She came down on the ledge, and then made a curious little shuffling run on to the nest, with her body held quite low. I did not note the exact time of her return, but it must, I think, have been well before 6.30—she would, however, have had plenty of time for a meal. It is now 8.40, and there has been no further exeat. For the last twenty minutes, or so, the bird has reversed her position

on the nest, and, during a considerable part of this time, there have been the movements upon it which puzzle me. They include vigorous motions of the tail, and by this I do not mean the rectrices merely, which are bent sharply down, and wagged from side to side, but the whole anal region, the actions exactly simulating those of the male bird (I am here speaking generally) *in coitu*. The wings are, from time to time, raised and partially opened, and, besides this—a curious point, as it may seem, but which helps me to see a meaning in the whole—the bird sometimes seizes twigs of the grass, &c., round about the nest, in its bill. What can such actions as these have to do with turning the eggs? Rather, it seems a wonder that the eggs are not broken; but we have here, upon the actual nest itself, and after the proper period of nidification, precisely those movements which both the male and female Peewit, for example, indulge in, during the early spring, in conjunction with a rolling motion of the body, as a result of which small round hollows in the soil are produced, any one of which might be (and one of which, as I suggest, probably becomes) the actual nest. To my inference that nest-building, amongst birds, has been evolved out of movements of a sexual or sexually induced nature, I need only, in this place, refer; but the repetition of such actions by a bird sitting upon the completed nest, and engaged in the duty of incubation, would, in that case, perhaps, be explicable, through association of ideas or inherited habit, induced by such an origin. I do not remember coming across any reference to movements of this kind made by birds, whilst incubating. Possibly they may not, heretofore, have been observed, but there is, I believe, a considerable disposition, in field natural history, to put aside facts which do not appear to group themselves with other facts more generally representative of the department under consideration, into which they may obtrude themselves, particularly when they do not belong to the more orthodox class of observation or suggest the more usual currents of thought. Such facts interrupt and upset—are a bother, in fact—so as one does not know what to do with them, one forgets altogether about them—gives them the go-by, as it were—but they remain, and remain to be accounted for.

10.30 a.m.—Since some little time, the bird has turned

herself round, in the nest, again, and now she begins to pluck grass, and then, again turning, lays it, apparently, in the nest, on that side. It is difficult to think there is any real need for this; the ledge is grassy, and the eggs, when I saw them (five in number) seemed to lie in a quite secure cup. We see here, I believe, a mingling of the incubatory with the nidificatory instinct, and the latter expresses itself not only in the placing of materials, but in such actions as would not, I believe, form a part of it, had it been architectural in its origin.

The male now flies into the home-gorge again, but, this time, either without a cry, or with a very faint one. The female, at any rate, pays no attention if he has uttered it, and he certainly flies about from point to point in silence. It is some little time before the female leaves the nest, and when she does I miss seeing her go off it. Before very long, she returns and broods the eggs, again, but leaves them again shortly afterwards and flies down upon the mountain side. Here I for some time, watch her, but she is only preening herself, and, moreover, could not have taken anything from the male without my seeing her do so. Whether she did upon the occasion of his last visit I cannot be certain, but from the facts and appearances which I have recorded, I think it more than likely.

It is now midday, and the female bird continues to cover her eggs for another hour, when she again flies from the ledge, but a rising wind is keeping me, at this time, busy with the tent, which, as before intimated, is on the brink of something approaching a precipice, and my having to brace it up from outside may have accounted for this exit. If so, my apologies are due to all collectors for thus disturbing the bird.

As I now leave the tent, for a short walk, one of the Merlins flies over the gorge, but I think this is the male, and when I return at 1.45 p.m., the female is on the nest again. Shortly afterwards, she flies off it, with the usual shrilly note, to the male, who has again flown in. They fly together, or, rather, she pursuing him, over the hill-side, and come down upon it, at a short distance from one another. Then the female makes a little dart at the male, who rises just as she comes down, and flies to as far away again, and this is repeated once, at least, if not more. It is the same scene as took place between them

yesterday, and, in each case, I believe that the female was demanding food of the male, which she then got, but does not appear to have now, for I do not see her eating anything, and, in a short time, she flies back to the nest. In about a quarter of an hour the male flies, first, onto the top of the nesting-rock, and then onto the ledge itself. I am surprised, as he has not done this before, whilst I have been here, and imagine he is about, for the first time, to take his place on the eggs. He seems, however, nervous and apprehensive, and having advanced a step or two, thinks better of it, and flies away. How natural to attribute this to the presence of the tent!—but see the event, which suggests another and much more interesting explanation. In a few minutes he returns, comes down upon the ledge again, and after a doubtful moment or two, walks along it, to the eggs, when the female, who has been upon them, all the time, makes a little run out at him, with a more *aigre* edition than I have yet heard of the sole note these birds seem to have—and at once puts him to flight. This is quite a new development, for it seems as if the male were wishing to take some share in the incubation of the eggs, but that the female insisted upon engrossing it all to herself. That he is aware, through various similar experiences, of what her feelings may be in the matter, is hardly to be doubted, and the uncertainty of his reception may well account for his evident state of nervous anxiety when approaching the eggs, as well as for his previous retreat. Moreover, this conduct of his tallies in an interesting manner with that of the male of a pair of Sparrow-Hawks, which I watched so secretly that they never, I believe, from first to last knew of me at all except as an occasional passer through the plantation, which I generally entered whilst it was still dark, and sat completely shrouded in foliage. This bird, too, seemed to fear the nest, and on the one, or perhaps two, occasions when he deposited booty there, only just did so and immediately flew away. Anticipating, I may say here that neither of these Merlins seemed to care at all about the tent so long as I was inside it. When they saw me, indeed they were disturbed and that violently—but only with anger and indignation, for as long as I was in the immediate proximity of the gorge, which they considered their property. Once unseen or away from it, they cared not a

moment longer—fear held no place in either of those tiny bold bosoms. For these reasons, I do not believe that, from first to last, either of the pair varied their nesting habits by one jot or one tittle; the Sparrow-Hawks become, here, a valuable criterion.

At 3.10 p.m. the male flies into the gorge again, uttering his cry, and the female, with the same note, flies out to him. Getting, as quickly as I can, to the tent's mouth, I see them come down upon the mountain-side at some dozen or twenty paces from one another. The female has nothing in her claws that I can see, and there is no sign of her eating. I shortly lose them both, but, in a very few minutes, the male flies on to the ledge, and after standing for a moment or two where he alighted—a very handsome little bird in the sunlight, his colouring much warmer, as his size is much less than the female's—takes his place upon the nest. Hardly has he been there two minutes, however, when his wife returns, he at once flies off again, and she takes her accustomed place. This, with the foregoing, is sufficient, I think, to show that incubation is, to some extent, at least, and during some period, shared between the sexes. But the eggs now are probably near to being hatched, and it seems as if the female bird could hardly permit herself to be away from them for more than a few minutes.

4.7 p.m.—The male flies into the gorge again, and the female goes off the nest to him. He settles on a grassy ledge of the cliffs that wall the chasm, and she upon an outstanding point of them, but nothing is brought her, and there is no meeting. Then, in a minute, she rises and flies outward from the gorge; I lose her, and just afterwards, at 4.9, the male takes his place upon the eggs, and remains there till 4.35. During this time I notice him, more than once, make the same kind of movements on the eggs as the female has so often done, but not quite so pronounced as hers usually (but not always) are. At 4.35, as I am steadily watching the sitting male, through the glasses, the female comes down on the edge of the nesting-ledge, on which he rises and comes off the nest, and she walks along the ledge and goes onto it, with the curious little run, before described, just as he flies off. Neither bird utters any cry or sound that I can hear. The difference both in size and color-

tion between the two is well seen, as both stand on the ledge, the male being a handsomer little fellow, whilst the female has a more imposing appearance. This has been the female bird's exeat of the day, and it is to be hoped that twenty-eight minutes has enabled her to procure a meal, if only a "nuncheon."

At 5.30 I go out, to brace the tent, again, the wind continuing, and, as before, when I started for a walk, the male flies up from somewhere near, with his little twittering squeak. And now, twice again, in going and returning from another one, I have put him up from somewhere within the gorge, or in its immediate precincts. It is his habit, therefore, when not engaged in procuring food, to keep on guard in the neighbourhood of the nest, and, as has been seen, the pair (and I have no doubt either of them alone) are capable of molesting even Eagles, should they encroach upon their preserve.

June 13th.—From some time after 7 a.m. the female was on the nest, but left it, without my perceiving her, before 8. Just before (as also several times during the earlier morning), I had heard the cry of the male, and have no doubt that, as usual, he was the occasion of her going. At a few minutes before 8, she returned, and stayed on the nest till 10.30 a.m., when she was again called off, as I think it may be correctly termed, by the male, who, as usual, uttered his cry. At 10.30 he again flew in, with it, and the female again left the nest. I could not ascertain whether she received anything from him, this time, and still less am I able to say if she did the time before; but this, whether disappointed or not, is always what she seems to expect. After some five or ten minutes, the male flew to the ledge, but left it again, without going on to the eggs. He returned in a few moments and covered them, but almost immediately went off again, and had hardly been gone a moment when the female flew in and took his place—he must, I think, have seen her coming. At 12, being called for by Sigurdsson, I struck my tent, and, leaving the bird still on the nest, departed for "fresh woods and pastures new"—there are woods in Iceland, though dwarf ones.

From the foregoing notes it would appear that, as with the Sparrow Hawk, there is a considerable differentiation between the domestic duties of the male and female Merlin, even during

the incubatory period. The statement which I have made in my Observational Diary of the former bird, that the female alone incubates is indeed much too wide and general, but the male never came to the nest while there were eggs in it, during the time that I watched the birds, and, as I say, I was unseen and unthought of whilst I watched them. On the other hand, he kept flying into the plantation with a cry, in response to which the female flew off the nest to him, and on some, if not all, of these occasions, she received from him booty, which he brought her. It was much, if not just, the same with these Merlins. The male did, indeed, do some part of the incubation, but it was a very small part, and on two occasions certainly, and once again probably, the female showed an impatience of his presence at the nest—on the first of these, indeed, she refused to come off it, and drove him from the ledge. Also, just as with the female Sparrow-Hawk, she flew out, at intervals, as an accustomed thing, to his cry, and it was then evident that she expected to get something—booty, namely—from him, which, on at least two occasions, she did get. In these meetings, the male did not come to or near the nest, at all, but went down, with the female, on the hillside, right away from it, or waited for her there. On the few occasions when he did come to it, it was a quite distinct thing, either after the meeting or without any meeting at all of this special kind. Nothing could be clearer than this, as will be seen by a reference to the text. What I have called the home-gorge, I may remark, ran down the whole slope of the mountain, till it ceased to be one—a very long way, that is to say, beyond what anyone would consider the vicinity of the nest, though the birds seemed to claim the whole of it. The male Sparrow Hawk, though he never once, whilst I watched, came to the nest during the incubatory period, yet in his similar visits, either with, or rousing expectations of booty, came incidentally much nearer to it, for he seemed to consider it his duty to enter the plantation, which was a quite small one.* In these meetings, therefore, of the male and incubating female, in the cry uttered by both, and the evident hope of the latter, on hearing it, which is sometimes realized and

* Of course, in this case, the purview of the female did not extend to the country beyond the plantation.

sometimes not, we have a close parallel between the two species, and this specialization of the parental duties in either sex which we here see in its earlier stages, becomes, in both of them, more complete, after the hatching of the eggs (see *post*). In the domestic relations of the Peregrine, the same fact is illustrated, but with a curious reversal of the relative parts played by the male and female, as shown by Dr. Heatherley's interesting account of the breeding habits of these birds. At least it seems curious that the male, rather than the female, should actually feed the young, but whether it is so in the sense of being an exception to the general habits of the family, we are not yet, perhaps, in a position to say.

(To be continued.)

NOTES AND QUERIES.

A V E S.

The Grey Wagtail (*Motacilla melanope*) in Sussex.—The nesting of the Grey Wagtail in East and West Sussex has been recorded ('British Birds,' vol. vi. p. 17, and 'The Zoologist,' 1912, p. 228), and it would appear likely that it has now done so in a more central part of the county. If a few passing birds in August are excepted, the Grey Wagtail may be said to be a winter visitor only to this district, but this year I have met with it occasionally since the first week in April, and on June 13th I saw two young birds in Buxted Park. I see no reason why this bird should not nest here, as there must be many suitable places for it, but this is the first year that I have met with the Grey Wagtail in nuptial plumage in the district, or have seen young birds in June.—ROBERT MORRIS (Uckfield, Sussex).

Courting Actions of the Shag.—In the lately issued Section xi. of Kirkman's 'British Bird Book,' Mr. Hartert quotes my description of the courting actions of the Shag (*Phalacrocorax graculus*). This, however, was founded upon what I saw during the latter part of the breeding season only, which was not by any means enough to allow me to tear out the heart of the bird's mystery. This I have now done—or, at least, come nearer to doing—in an earlier and more continuous series of observations, and I should like to state that there are some peculiarities in the sexual relations of this species, which, as far as I know, have been hitherto unsuspected. My present notes make this evident, but I do not quite know when I shall be able to publish them.—EDMUND SELOUS.

Velocities of Migratory Birds: Corrections.—I hasten to correct an awkward slip in my paper of last month. On page 245, line 6 from the bottom, "3 minutes 56 seconds" should be "11 minutes 56 seconds." Col. Seely's exact words were "four seconds less than twelve minutes," but in this case 105 should be the velocity, rather than the 115 actually mentioned by him. Perhaps here I ought also to apologise for a cruelly redundant s in line 2, page 241, and an unintentional bit of phonetic spelling on the next page, line 13.—FREDK. J. STUBBS.

BIBLIOGRAPHY.

A Rare Zoological Publication.—The sale of the Huth Library has given us the opportunity to acquire a work to which at length the attention of zoologists should be drawn. We refer to the miniatures by Georg Hoefnagel, painted between 1576 and 1582, giving figures covering the whole range of the animal kingdom. Executed for the Emperor Rudolph II., who, it is related, paid one thousand golden crowns for each of the four volumes, still they must have passed out of the Imperial treasures, as in course of time they went successively from one private collection to another. We find references to the work in Sandrart's biographies (1774), in the biography of the artist by Fetis, in Nagler's 'Kuenstler Lexicon,' and in Hagen's 'Bibliotheca Entomologica,' but the meagre descriptions, given by the authors on art referred to, are copied from each other, and Hagen, though he realized its great value, was unfortunately unable to see the work.

Anyone examining Hoefnagel's paintings is bound to admit that they are the creations of a great artist, but the point of paramount importance is the fact that he must have been a keen observer, who, not merely working with imaginative genius upon drawings already in existence, depicted with inimitable skill the material he had before him in the faunas of his own and of other countries that he visited during his travels. A complete iconography being evidently his purpose, he had to include some animals which he could know only by repute or from the descriptions of others, and thus the eye is pleased with a credible Barnacle Goose and other mythical creatures.

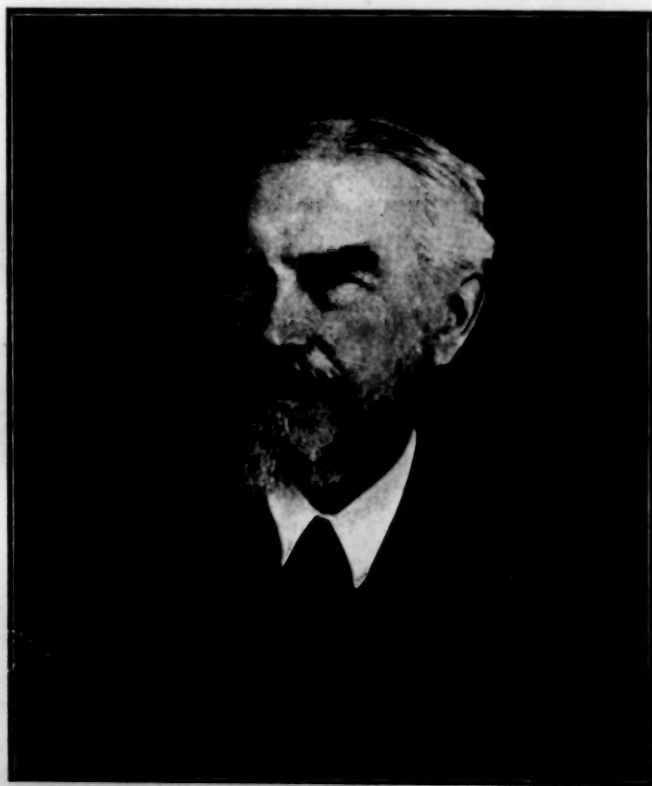
Though Georg Hoefnagel may be little known at present in the history of zoology, we claim for him his place as the father of the coloured zoological illustration, and that his work remains to the present day in many respects unsurpassed. The history of the art of depicting natural history objects remains to be written, but some readers of 'The Zoologist' may be interested in it. These are invited to inquire into the truth of our statement by personal inspection, by permission and request of its purchaser. — WM. WESLEY & SON (28, Essex Street, Strand, London).

[We are informed that the work is sold, and will find its home in a Hampshire library.—ED.]

OBITUARY.

PHILIP LUTLEY SCLATER.

ANOTHER of the prominent zoologists of our generation has passed away in the person of Dr. Philip Lutley Sclater, D.Sc., F.R.S., who died on June 27th last at the mature age of eighty-three years; he was born on November 4th, 1829, and lived a busy scientific life throughout.



As Secretary of the Zoological Society of London from 1859 to 1902, he would, if necessary, be alone remembered by British naturalists. He was essentially for many years the strong man of that Society, and at the time when the strong hand of an earnest zoologist was essential in building up what has been described by a well-known American authority as "the most wealthy and vigorous Zoological Society in the world," he wielded possibly a greater power

—and that for good—than is usually associated with purely secretarial responsibilities. The publications of the Society for the long period under his editorship, the growth of the great library, and the success of the Gardens, under old-time regulations, will bear ample witness to his official value and energetic action.

Dr. Sclater as an ornithologist has also left his mark on that favourite science; his studies and publications were principally in connection with the Central and South American faunas. He was one of the founders of the British Ornithologists' Union, and the first editor of its journal, 'The Ibis.' Both "Union" and "publication" will cherish his memory. He was conservative on the question of nomenclature, as are many more of us, though the proposed changes are clearly on the rising tide.

The biological standard of his career, and one that will outlive his faunistic labours, is his great pioneer work in the study of the Geographical Distribution of Animals. The natural divisions he recognized, and the names he gave them we use and write now, and they will be used and written hereafter; nor can we forget his paper "On the Distribution of Marine Mammalia," which was first printed in this Magazine (1897, p. 217).

Dr. Sclater, at the Zoological Society, possessed the methods of a business man in the best sense of the word; his legal training—for he was called to the Bar and went on the Western Circuit for several years—doubtless gave him the gift of personal analysis among those with whom he was thrown in contact. He could thus identify young men who were really naturalists at heart and by instinct; these he never failed to help and assist by all means in his knowledge, and he has doubtless promoted many careers. He was not only a zoologist, but was also of a fine manly character, which ensured the respect of those with whom he was associated. His first publication, a "Note on the Water-Rail," was in 'The Zoologist,' and appeared in 1844; so that we have probably lost our oldest contributor.

W. L. D.

NOTICES OF NEW BOOKS.

A Dictionary of English and Folk-Names of British Birds, &c.

By H. KIRKE SWANN. Witherby & Co.

THIS is a volume compiled with considerable knowledge and research, while it appeals to bookmen as well as ornithologists by its bird-lore, a subject in old literature to which a good reference is frequently imperative. In turning over its pages we noticed that the Cornish name for the Chough and also for the Hooded Crow is "Market Jew Crow," which has explained the well-known name of a street in Penzance—"Market Jew Street"—which had often puzzled us not a little. Some names of common birds in use by the old and now happily almost extinct professional birdcatchers would well bear record if they could be garnered, for doubtless they are still used in the quarters where these diminished gentry live, though no longer flourish. In the schoolboy days of the present writer a Chaffinch was always referred to by a man with the nets as a "chuck wido."

Mr. Swann gives a good bibliography, and has consulted most of the best books on the subject. In a future edition he might add to his list 'Bird Gods,' by Charles de Kay, a book from which something may be gleaned. Thus the Wryneck, "in the vulgar speech of Germany," is stated to be known as the "Cuckoo's maiden,"* perhaps because the ancients fancied that the bird was twisting its head round to see its admired one, the Cuckoo." It is not, however, on what is unmentioned in this volume that we wish to be critical, but rather to gratefully acknowledge the large amount of information that can be found in its pages.

* In Suffolk it is sometimes known as the "Cuckoo-leader."

The Food of some British Wild Birds: a Study in Economic Ornithology. By WALTER E. COLLINGE, M.Sc., F.L.S.
Dulau & Co. Limited.

WHEN we read in the Preface to this volume that the conclusions arrived at in its pages "have only been obtained after a considerable amount of work extending over many years, during which period numerous observations have been made in the field, and of the stomach contents of upwards of three thousand adult birds and three hundred nestlings" we feel that a considerable addition to our knowledge on the subject must have been made, nor are we disappointed on a perusal of the small book of slightly over a hundred pages. The majority of our wild birds are passed over, as some are so rare or small in numbers as to be practically ignored, those aquatic or littoral in habits are neglected, as are also those which feed exclusively on insect life; this leaves about thirty-five species, and of these twenty-nine are dealt with. Most of the well-known authorities are quoted, and each bird has its full record of diet and depredation. The Goldfinch certainly needs little consideration, as, Mr. Collinge states, "this bird is by no means so common in the Midland counties as formerly," while in Surrey, or at least in a large part of that county, we can answer for its ever-growing scarcity, whilst its worst character is that of a distributor of "weed seeds." The House-Sparrow, however well deserving its name of "avian rat," is certainly a notorious pest, though we quite agree with the conclusion of our author: "The Sparrow has been allowed to increase to such an extent that it has become one of the worst bird pests we have, but if it were reduced to such numbers as to be no commoner than, say, the Robin, I believe the good it would do would more than compensate for the harm. At present the attitude of all farmers must be one of extermination, and to this end it would seem very desirable that the use of poisoned grain should be permitted."

The Bibliography is almost confined to publications written in the English language.

EDITORIAL GLEANINGS.

MR. PERCY M. CLARK, F.R.G.S., writes from the Victoria Falls, calling attention to the trapping of small Monkeys which is being carried on there. He points out that the Monkeys are entirely inoffensive, and are, in their natural haunts, of great interest to visitors, and it seems a great pity that they should be frightened away, as will be the case in a short time if this trapping continues. Visitors to the Falls, he adds, much prefer to see Monkeys in the Rain Forest and Palm Kloof than boxed up in a cage. That is not natural, and the little fellows are so absolutely harmless.—'The African World,' August 9th, 1913.

ROOKS AT SANDOWN PARK.—"Gareth," writing in the 'Referee' of August 10th, 1913, says:—I heard something during the afternoon, unconnected with horses, which interested me not a little, being a student and a lover of birds. As sportsmen are aware, there is an extensive rookery at Sandown. In the immediate neighbourhood of the racecourse a considerable amount of corn is grown, and it might be supposed that the Rooks would take liberal toll. These birds are generally accused of doing an infinity of mischief to buds, blossoms, and growing crops in all stages of their growth, from the time the sprouts appear to the period when the corn is ripe. Mr. Hwfa Williams assures me that the Sandown Rooks are never known to go outside the Park; the corn does not in the least tempt them, nor have they any hankering after other vegetarian diet; they busily devote themselves to destroying the five-furlong course by delving down for wireworms, which, of course, are a pest; so the birds do a great deal of good and no harm to farmers and fruit-growers round about, though the mischief they effect on the course—why they should prefer the five-furlong to the rest of the grounds I have no idea, but so it appears to be—is a standing cause of expenditure.

